CLAIMS

1. Support element for an integrated blood treatment module, comprising a main body having a front wall and at least a peripheral wall projecting away from said front wall, said front wall and said peripheral wall defining a housing compartment.

2. Element according to claim 1, characterized in that the front wall is basically plane.

3. Element according to claim 1, characterized in that the front wall is delimited by a given number of sides, the peripheral wall projecting away from each of said sides.

4. Element according to claim 3, characterized in that said sides are basically rectilinear.

5. Element according to claim 1, characterized in that the front wall comprises at least first sides and second sides that are basically parallel and facing each other.

6. Element according to claim 5, characterized in that the front wall is delimited by first opposite longer sides with a basically rectilinear development, each having two curved portions whose cavity faces its respective opposite side.

7. Element according to claim 6, characterized in that each of said curved portions is defined by an arc of circle.

8. Element according to claim 5, characterized in that the front wall is delimited by second opposite shorter sides with a basically rectilinear development.

9. Element according to claim 8, characterized in that at least one of said second sides has a curved portion placed between two rectilinear lengths, the cavity of said curved portion facing the opposite side.

10. Element according to claim 9, characterized in that the curved portion is defined by an arc of circle.

11. Element according to claim 9, characterized in that each of said curved portions is defined by an arc of circle, the arc of circle defining the curved portion has a greater radius of curvature than the curved portions defined on the first opposite longer sides.

12. Element according to claim 5, characterized in that the peripheral wall has a least a portion projecting away from each of said first opposite sides.

13. Element according to claim 5, characterized in that the peripheral wall has at least a portion projecting away from each of said second opposite sides.

14. Element according to claim 1, characterized in that the peripheral wall projects away from all the sides of the front wall defining a basically continuous surface delimiting the housing compartment.

15. Element according to claim 1, characterized in that the housing compartment has an access opening without closing wall designed to face, when the support element is being used, a respective machine for extracorporeal blood treatment.

16. Element according to claim 1, characterized in that the main body has a substantially C-shaped profile sectioning a plane transversal to the front surface.

17. Element according to claim 1, characterized in that the front wall has a given number of through openings putting into communication the housing compartment with an outside environment.

18. Element according to claim 17, characterized in that the front wall comprises at least first sides and second sides that are basically parallel and facing each other, at least one of said second sides has a curved portion placed between two rectilinear lengths, the

cavity of said curved portion facing the opposite side, at least an opening is placed on each of the curved portions.

19. Element according to claim 18, characterized in that each of said curved portions is defined by an arc of circle, said openings placed on each of the curved portions are defined by round holes that are concentric with the respective arcs of circle.

20. Element according to claim 1, characterized in that said front wall, or the whole main body is at least partly transparent.

21. Element according to claim 1, characterized in that said main body is made of stiff material.

22. Element according to claim 1, characterized in that said front and peripheral wall define a main body having a box-shaped structure basically closed on five out of its six faces.

23. Element according to claim 9, characterized in that it comprises at least a first and a second engagement connector respectively fastened to said rectilinear lengths of one of said second sides.

24. Element according to claim 6, characterized in that it comprises pairs of engagement connectors respectively secured near each of said curved portions of the first longer sides.

25. Element according to claim 23, characterized in that said engagement connectors are carried out as one piece with the main body.

26. Element according to claim 23, characterized in that said connectors are secured to the peripheral wall, for instance on a free edge of the peripheral wall.

27. Element according to claim 23, characterized in that each engagement connector defines a gap towards the

housing compartment.

28. Element according to claim 1, characterized in that it further comprises a support structure associated to the main body and placed laterally with respect to the latter.

29. Element according to claim 28, characterized in that the support structure is firmly secured to the main body.

30. Element according to claim 29, characterized in that the support structure is carried out as one piece with the main body.

31. Element according to claim 28, characterized in that the front wall comprises at least first sides and second sides that are basically parallel and facing each other, the front wall being delimited by first opposite longer sides with a basically rectilinear development, the support structure being engaged to the main body on one of said longer sides.

32. Element according to claim 31, characterized in that the support structure is engaged to the main body on said curved portions of one of said longer sides.

33. Element according to claim 28, characterized in that the support structure comprises a positioning fin having a given number of main seats designed to be engaged with respective tubes of a fluid distribution circuitry to be associated to the support element.

34. Element according to claim 33, characterized in that at least two, and generally 3 of said main seats are placed on their respective engagement connector placed near the curved portions of one of the first longer sides.

35. Element according to claim 34, characterized in that said three main seats and the respective connectors are placed so as to receive parallel tube lengths.

36. Element according to claim 34, characterized in that the positioning fin comprises two further main seats, the support structure comprising two auxiliary portions, each being equipped with a respective auxiliary seat, the two further main seats cooperating with their respective auxiliary seats so as to enable the positioning of tube lengths that are parallel to each other and in general to those carried by said three main seats.

37. Element according to claim 28, characterized in that the support structure comprises at least a first covering wall lying on a plane parallel to the plane of the front wall so as to cover, in operating conditions of the support element, at least two parallel tube lengths.

38. Element according to claim 37, characterized in that the support structure comprises at least a second covering wall lying on a plane parallel to the plane of the front wall so as to cover, in operating conditions of the support element, at least two further parallel tube lengths.

39. Element according to claim 1, characterized in that the housing compartment houses at least a portion of a fluid distribution circuitry designed to be associated to the support element.

40. Element according to claim 16, characterized in that the main body has C-shaped sections orthogonal to one another sectioning two planes orthogonal to one another and transversal to the front surface.

41. Element according to claim 28, characterized in that the support structure has a height that is smaller than or the same as the height of the peripheral wall of the main body.

42. Element according to claim 1, characterized in that it further comprises at least one, and generally two posi-

tioning projections associated to the main body and designed to enable a correct positioning of a tube length to be associated to the support element.

43. Element according to claim 42, characterized in that the first and the second positioning projection are placed inside the housing compartment and generally associated to the front wall.

44. Element according to claim 1, comprising at least a first and at least a second connector associated to the main body and spaced away from one another, designed to be engaged with corresponding counter-connectors of a blood treatment unit to be mounted onto the support element.

45. Support element according to claim 44, in which the first and the second connector are directly engaged to the main body.

46. Support element according to claim 45, in which the first and the second connector are carried out as one piece with the main body.

47. Support element according to claim 44, comprising at least a third connector spaced away from said first and second connector and directly engaged to the main body, said connectors defining pairs of connectors having a different distance between central axis so as to engage corresponding pairs of counter-connectors associated to different blood treatment units to be mounted onto the support element.

48. Support element according to claim 47, in which the third connector is carried out as one piece with the main body.

49. Support element according to claim 1, in which each of said connectors defines a fluid passage having a first end portion designed to be put into fluid communication with a corresponding channel present in the respective

counter-connector carried by the treatment unit, and a second end portion designed to be put into fluid communication with a fluid distribution circuit to be associated to the main body.

50. Support element according to claim 49, in which each of said connectors comprises:

- a tubular channel defining said first portion,
- a sealing collar placed radially outside the tubular channel, and
- a connection wall developing without interruptions between an outer side surface of the tubular channel and an inner side surface of said collar so as to define a ring-shaped engagement seat for each said counter-connector.

51. Support element according to claim 50, in which the tubular channel defining said first portion is coaxially arranged with respect to the sealing collar, said ring-shaped seat having a bottom delimited by the connection wall.

52. Support element according to claim 51, in which said ring-shaped seat has a radial size increasing away from the bottom wall.

53. Support element according to claim 52, in which said ring-shaped seat has a first zone near said bottom and having a constant radial size, a second zone distal with respect to said bottom and with a constant radial size greater than the radial size of said first zone, and a third zone between the first and the second zone, having a progressively increasing size away from the bottom wall.

54. Support element according to claim 50, in which the tubular channel and the sealing collar of each connector project parallel to one another from the main body so as to define one direction of coupling with the corre-

sponding counter-connectors of a treatment unit.

55. Support element according to claim 47, comprising a fourth connector spaced away from said first, second and third connector, said fourth connector being as one piece with the main body and defining with at least one of the other connectors another pair of connectors to be engaged to a corresponding pair of counter-connectors associated to a blood treatment unit to be mounted onto the support element.

56. Support element according to claim 55, in which the fourth connector comprises:

- a cylindrical central positioning body,
- a sealing collar placed radially outside the cylindrical body, and
- a connection wall developing without interruptions between an outer side surface of the cylindrical body and an inner side surface of said collar,

said fourth connector defining an engagement and flow-closing body for a counter-connector of the treatment unit.

57. Support element according to claim 45, in which said connectors and said main body are carried out with a stiff material so as to define a mechanical support for said treatment unit.

58. Support element according to claim 47, in which said connectors are aligned one with respect to the other.

59. Support element according to claim 45, in which said connectors are placed on one side of said main body.

60. Support element according to claim 44, characterized in that the front wall comprises at least first sides and second sides that are basically parallel and facing each other, a support structure being associated to the

main body, the connectors and the support structure being placed laterally with respect to the main body on one of said first sides.

61. Support element according to claim 60, comprising an auxiliary structure extending laterally and outside with respect to said operating seat from a base zone of the peripheral wall, said connectors projecting from the auxiliary structure.

62. Support structure according to claim 47, in which said connectors are not aligned one with respect to the other.

63. Support element according to claim 1, characterized in that it is designed to be coupled, when in use, to an extracorporeal blood treatment machine.

64. Integrated fluid treatment module comprising:

- a support element according to any of the preceding claims;
- at least one blood treatment unit engaged to the support element;
- a fluid distribution circuitry associated to the support element and cooperating with the treatment unit.

65. Module according to claim 64, characterized in that the fluid distribution circuitry comprises at least a blood line having a blood withdrawal branch and a blood return branch.

66. Module according to claims 9 and 64, characterized in that the blood line is secured to the support element on one of said second sides having the curved portion.

67. Module according to claim 66, characterized in that the blood line is secured to the support element so as to define at least a tube length arranged as a U with respect to said support element, the tube length being

designed to cooperate with a respective pump.

68. Module according to claim 67, characterized in that the U-shaped tube length extends inside the peripheral wall of the support element.

69. Module according to claims 42 and 67, characterized in that the positioning projections act on the U-shaped tube length of the blood line to keep its position.

70. Module according to claim 67, characterized in that the length of the blood line secured to the support element is defined by the withdrawal branch.

71. Module according to claim 64, characterized in that the fluid distribution circuit further comprises at least an intake line for a fresh dialysis liquid.

72. Module according to claims 6 and 71, characterized in that the intake line for fresh dialysis liquid is fastened to the support element on one of said first opposite longer sides.

73. Module according to claim 72, characterized in that the intake line for fresh dialysis liquid is secured to the support element so as to define at least a tube length arranged as a U with respect to said support element, said tube length being designed to cooperate with a respective pump.

74. Module according to claim 72, characterized in that the U-shaped tube length extends inside the peripheral wall of the support element.

75. Module according to claims 33 and 71, characterized in that the intake line is secured to the main body on the support structure, at least an inlet length of the intake line being engaged into a main seat of the positioning fin and to the respective engagement connector, at least an outlet length of the intake line being engaged into a main seat of the positioning fin and to the respective engagement connector.

76. Module according to claim 75, characterized in that the inlet and outlet lengths engaged to the connectors are placed in rectilinear arrangement and are parallel to one another.

77. Module according to claim 75, characterized in that the outlet length has a branching into intake branch designed to convey the fluid to the blood treatment unit, and into infusion branch designed to convey the fluid into the blood line.

78. Module according to claim 77, characterized in that the branching into infusion branch and intake branch is defined on an engagement connector.

79. Module according to claim 77, characterized in that the infusion branch is secured to an auxiliary seat and to another main seat.

80. Module according to claim 77, characterized in that the infusion branch and the intake branch, when engaged to the support structure, are placed in rectilinear arrangement and are parallel to one another.

81. Module according to claim 64, characterized in that the fluid distribution circuitry comprises at least an infusion line.

82. Module according to claims 6 and 81, characterized in that the infusion line is secured to the support element on one of said first opposite longer sides.

83. Module according to claim 82, characterized in that the infusion line is fastened to the support line so as to define at least a tube length arranged as a U with respect to said support element, said tube length being designed to cooperate, when in use, with a respective pump.

84. Module according to claim 83, characterized in that the tube length arranged as a U extends inside the peripheral wall of the support element.

85. Module according to claims 33 and 81, characterized in that the infusion line is secured to the main body on the support structure, at least an outlet length of the infusion line being engaged into a main seat of the positioning fin and to the respective engagement connector.

86. Module according to claim 85, characterized in that the outlet length has a branching into pre-infusion branch designed to convey the fluid to a withdrawal branch of the blood line, and into post-infusion branch designed to convey the fluid to a blood return branch of the blood line.

87. Module according to claim 86, characterized in that the branching into pre-infusion branch and post-infusion branch is defined on an engagement connector.

88. Module according to claim 86, characterized in that the pre-infusion branch is secured to an auxiliary seat and to another main seat of the positioning fin.

89. Module according to claim 86, characterized in that the pre-infusion branch and the post-infusion branch, when engaged to the support structure, are placed in rectilinear arrangement and are parallel to one another.

90. Module according to claim 64, characterized in that the fluid distribution circuit comprises at least a discharge line.

91. Module according to claims 6 and 90, characterized in that the discharge line for a waste fluid is secured to the support element on one of said first longer sides.

92. Module according to claim 91, characterized in that said discharge line is secured to the support element so as to define at least a tube length arranged as a U with respect to said support element, said tube length being designed to cooperate, when in use, with a respective pump.

93. Module according to claim 92, characterized in that the U-shaped tube length extends inside the peripheral wall of the support element.

94. Module according to claims 33 and 90, characterized in that the discharge line is fastened to the main body on the opposite side with respect to the support structure, an inlet length and an outlet length of the discharge line being engaged into corresponding engagement connectors.

95. Module according to claim 64, characterized in that the fluid distribution circuit comprises at least an auxiliary pre-infusion line.

96. Module according to claims 6 and 95, characterized in that the pre-infusion line is fastened to the support element on one of said first opposite longer sides.

97. Module according to claim 96, characterized in that said pre-infusion line is secured to the support element so as to define at least one tube length arranged as a U with respect to said support element, said tube length being designed to cooperate, when in use, with a respective pump.

98. Module according to claim 97, characterized in that the U-shaped tube length extends inside the peripheral wall of the support element.

99. Module according to claims 33 and 95, characterized in that the auxiliary pre-infusion line is fastened to the main body on the opposite side with respect to the support structure, at least an inlet length and at least an outlet length of the auxiliary pre-infusion line being engaged into corresponding engagement connectors.

100. Module according to claim 67, characterized in that the length of every U-shaped tube portion is smaller than or the same as $(\pi R + 2R)$, where R is the respective radius of curvature of the tube length.

101. Integrated module according to claim 67, in which the fluid distribution circuit comprises further fluid lines secured to the support element, each defining at least a tube length arranged as a U with respect to said support element, each tube length being designed to cooperate, when in use, with a respective pump, the support element having a first zone to which the portion of the blood line is fastened, and at least a second zone opposite said first zone, the other fluid lines being all secured on said second zone.

102. Module according to claim 101, characterized in that the U-shaped tube length of the blood line is longer than the tube lengths defined by the other fluid lines.

103. Module according to claim 64, characterized in that the U-shaped tube length of the blood line has a greater radius of curvature than the tube lengths defined by the other fluid lines.

104. Module according to claim 101, characterized in that said second zone comprises at least two half-parts placed side by side, at least the tube length of the discharge line of a waste fluid being fastened to the second half-part.

105. Module according to claim 101, characterized in that said second zone comprises at least two half-parts placed side by side, at least the tube length of the intake line for fresh liquid being fastened to the first half-part.

106. Module according to claim 101, characterized in that said second zone comprises at least two half-parts placed side by side, at least the tube length of the infusion line being fastened to the first half-part.

107. Module according to claim 101, characterized in that said second zone comprises at least two half-parts placed side by side, at least the tube length of the auxiliary pre-infusion line being fastened to the sec-

ond half-part.

108. Module according to claims 9 and 101, characterized in that the first zone is partly delimited by at least one of said second sides having the curved portion and by a portion of the first opposite longer sides beside said second side having the curved portion.

109. Module according to claims 9 and 101, characterized in that the second zone is partly delimited by one of said second sides without the curved portion and by a portion of the first opposite longer sides beside said second side without the curved portion.

110. Module according to claim 101, characterized in that, when the module is associated to an extracorporeal blood treatment machine, the first zone of the support element is placed below the second zone of the support element.

111. Module according to claim 104, characterized in that, when the module is associated to an extracorporeal blood treatment machine, the first and second half-part of the second zone of the support element are placed side by side.

112. Module according to claims 5 and 101, characterized in that one of said second sides without the curved portion has no tube length directly fastened thereto.

113. Module according to claim 104, characterized in that the first and second half-part are specularly symmetrical with respect to a longitudinal axis of the main body.

114. Module according to claim 64, in which said treatment unit is fastened to the main body on at least a pair of connectors.

115. Module according to claim 114, characterized in that said pair of connectors is placed between counter-connectors and a portion of the fluid distribution cir-

cuit.

116. Module according to claim 64, in which said treatment unit comprises:

- a housing body;
- at least a semipermeable membrane operating inside the housing body defining a first and a second chamber;
- a first and a second counter-connector associated to the housing body and fastened to respective connectors associated to the main body, at least one of said first and second counter-connector being put into fluid communication with the second chamber of the treatment unit and with respective first end portions of said connectors;
- at least an access door to said first chamber; and
- at least an exit door from said first chamber.

117. Module according to claim 116, in which the fluid distribution circuit comprises at least a discharge line for a waste fluid, put into communication with the second end portion of one of said connectors.

118. Module according to claim 117, in which the fluid distribution circuit comprises at least an intake line for fresh dialysis liquid, put into communication with the second end portion of one of said connectors.

119. Module according to claim 116, in which the fluid distribution circuit comprises at least a blood line having a blood withdrawal branch, put into communication with the access door to the first chamber, and at least a blood return line, put into communication with the exit door from the first chamber.

120. Module according to claim 101, characterized in that the blood line has tubes carried out with a different material with respect to the other fluid lines.

121. Machine for extracorporeal blood treatment comprising a body having on its surface a given number of pumps designed to cooperate with a fluid distribution circuitry, characterized in that the machine body has a guiding and positioning projection protruding from the surface designed to be coupled, when in use, with a respective peripheral wall of a support element in accordance with any of the claims 1 to 63.

122. Machine according to claim 121, characterized in that the guiding and positioning projection has a side surface basically counter-shaped to the profile of the peripheral wall of the support element.

123. Machine according to claim 121, characterized in that said pumps protrude from the surface of the machine body, at least a part of the side surface of said pumps being counter-shaped to the peripheral wall of the support element.

124. Machine according to claim 123, characterized in that, when the support element is engaged to the machine, the peripheral wall of the support element surrounds the side surface of said pumps and of said guiding and positioning projection.

125. Machine according to claim 121, characterized in that the protruding pumps and the guiding and positioning projection define together seats, for instance basically semicircular, into which corresponding U-shaped tube lengths are engaged.

126. Machine for extracorporeal blood treatment according to claim 121, characterized in that at least one of said pumps is a blood pump designed to cooperate with a respective blood pump of the distribution circuitry, the machine body defining on its surface a first zone having said blood pump and at least a second zone opposite said first zone and comprising the other pumps.

127. Machine according to claim 126, characterized in that

at least one of said pumps is an intake pump and is designed to cooperate with a respective intake line for fresh dialysis liquid of the distribution circuitry.

128. Machine according to claim 127, characterized in that said second zone comprises at least two half-parts place side by side, the intake pump being placed in said first half-part.

129. Machine according to claim 126, characterized in that in operating conditions the first zone of the machine body is placed below the second zone of said body.

130. Machine according to claim 128, characterized in that in operating conditions the first and second half-part of the second zone of the machine body are placed side by side.

131. Machine according to claim 128, characterized in that said first and second half-part are perfectly symmetrical.

132. Machine according to claim 126, characterized in that at least one of said pumps is a suction pump designed to cooperate with a respective discharge line of the distribution circuitry.

133. Machine according to claim 132, characterized in that said second zone comprises at least two half-parts place side by side, the suction pump being placed in said second half-part.

134. Machine according to claim 126, characterized in that at least one of said pumps is an infusion pump designed to cooperate with a respective infusion line of the distribution circuitry.

135. Machine according to claim 134, characterized in that said second zone comprises at least two half-parts place side by side, the infusion pump being placed in said first half-part.

136. Machine according to claim 126, characterized in that at least one of said pumps is an auxiliary pre-infusion pump designed to cooperate with a respective auxiliary pre-infusion line of the distribution circuitry.

137. Machine according to claim 136, characterized in that said second zone comprises at least two half-parts place side by side, the auxiliary pre-infusion pump being placed in said second half-part.

138. Machine according to claims 127, 132, 134 and 136, characterized in that said blood, intake, discharge, infusion and auxiliary pre-infusion pumps are peristaltic pumps.

139. Machine according to claim 138, characterized in that each peristaltic pumps comprises a moving arm rotating around a fulcrum, and an active element, fastened to the moving arm rotating with it, operating on at least a deformable tube length associated thereto.

140. Machine according to claim 139, characterized in that the moving arm of the blood pump is longer than that of other pumps.

141. Machine according to claim 132, characterized in that it is designed to receive an integrated fluid treatment module in accordance with any of the claims 64 to 120.

142. Machine according to claim 121, comprising an integrated module in accordance with claim 64, characterized in that it comprises a moving element operatively acting on the infusion branch and/or on the intake branch on the support structure engaged to the main body so as to selectively determine the blocking or the passage of fluid within said infusion branch or intake branch.

143. Machine according to claim 142, characterized in that said moving element is mounted directly onto the machine body.

144. Machine according to claim 121, comprising an integrated module in accordance with claim 64, characterized in that it comprises a further moving element acting on said pre-infusion branch and/or on said post-infusion branch so as to selectively determine the blocking or the passage of fluid within said pre-infusion branch or within said post-infusion branch.

145. Machine according to claim 144, characterized in that said moving element is mounted directly onto the machine body.

146. Support element for an integrated blood treatment module, characterized in that it comprises a main body having a front wall and at least a peripheral wall projecting away from said front wall, said peripheral wall and said front wall defining together a housing body for housing at least a portion of a fluid distribution circuitry designed to be associated to the support element sectioning two planes that are almost orthogonal to one another and transversal to the front surface, said main body having basically C-shaped sections orthogonal to one another.